(12) UK Patent Application (19) GB (11) 2 207 331 (13) A

(43) Application published 1 Feb 1989

(21) Application No 8714684

(22) Date of filing 23 Jun 1987

(51) INT CL⁴
A01K 61/02

(52) Domestic classification (Edition J):
A1A 9

(56) Documents cited
GB A 2151442 GB A 2091531 GB A 2017478
GB 1594447 GB 1398514 GB 1316139
GB 1106518 EP A2 0022449 US 3717125

(58) Field of search
A1A
Selected US specifications from IPC sub-class
A01K

(71) Applicant
Sealand Industrial Co Ltd

(Incorporated in Hong Kong)

5/F Hung Fuk Factory Building, 60 Hung To Road, Kwun Tong, Kowloon, Hong Kong

(72) Inventor
Ka-Duk Lam

(74) Agent and/or Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields, London, WC2A 3LS

(54) Fish food dispenser

(57) A fish food dispenser comprises a container (12) for fish food, and a metering screw (10) mounted for rotation in a metering chamber (11) and driven by an electric motor (M) *via* a reduction gear train (23) for dispensing fish food from the container. The fish food may be dispensed daily at a time presettable by means of an electronic control circuit (21), or may be dispensed at any time by means of a manual switch provided in the control circuit. The quantity of fish food to be dispensed is also presettable by means of the control circuit. An alarm indicating food is about to be dispensed may be provided.

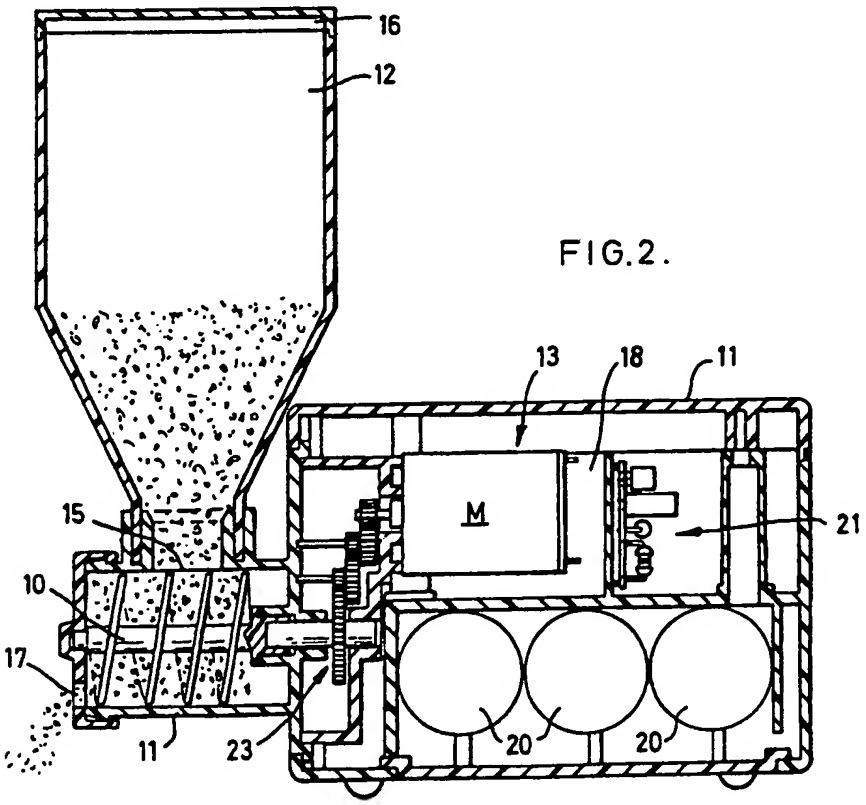


FIG.2.

GB 2 207 331 A

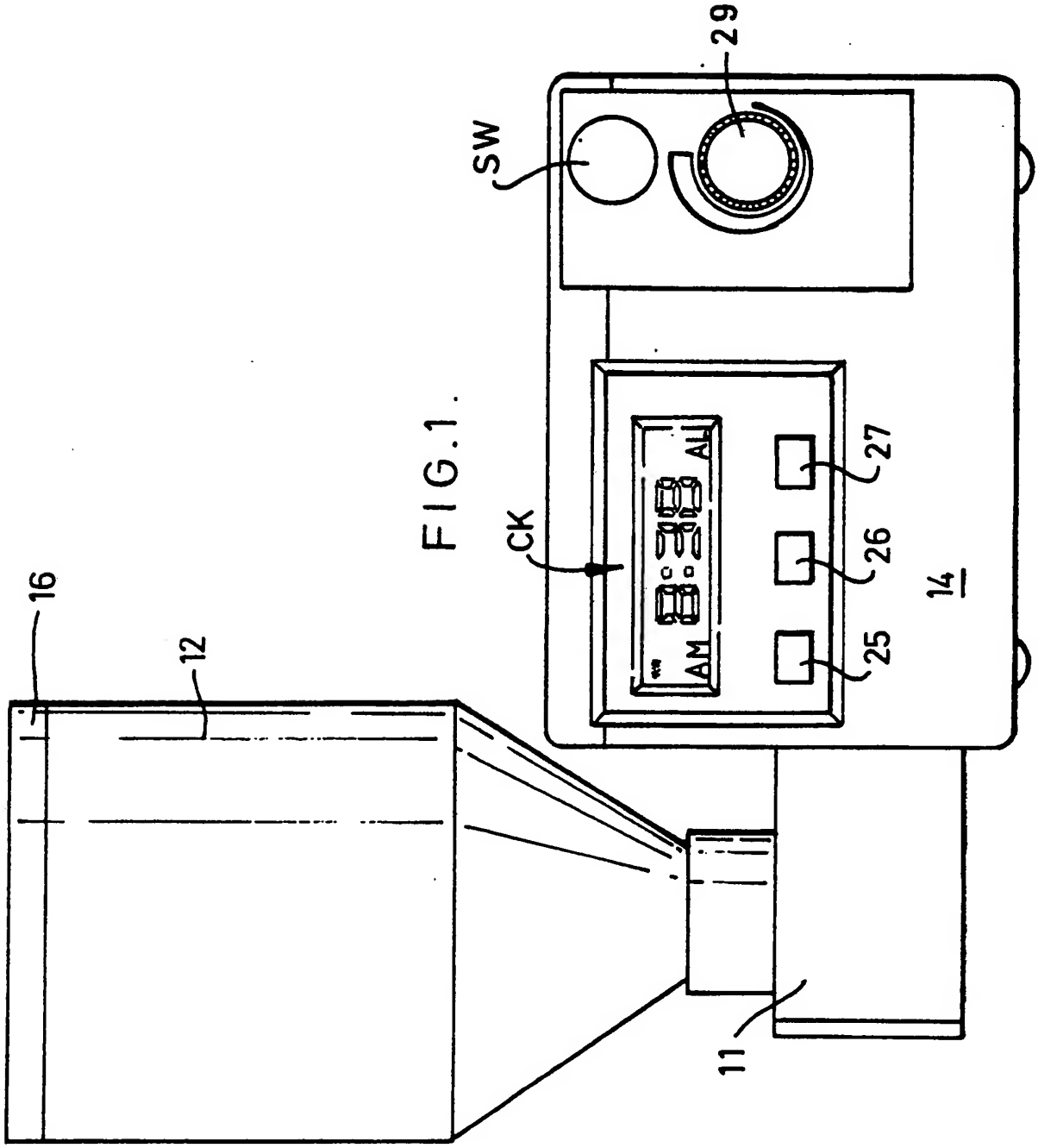
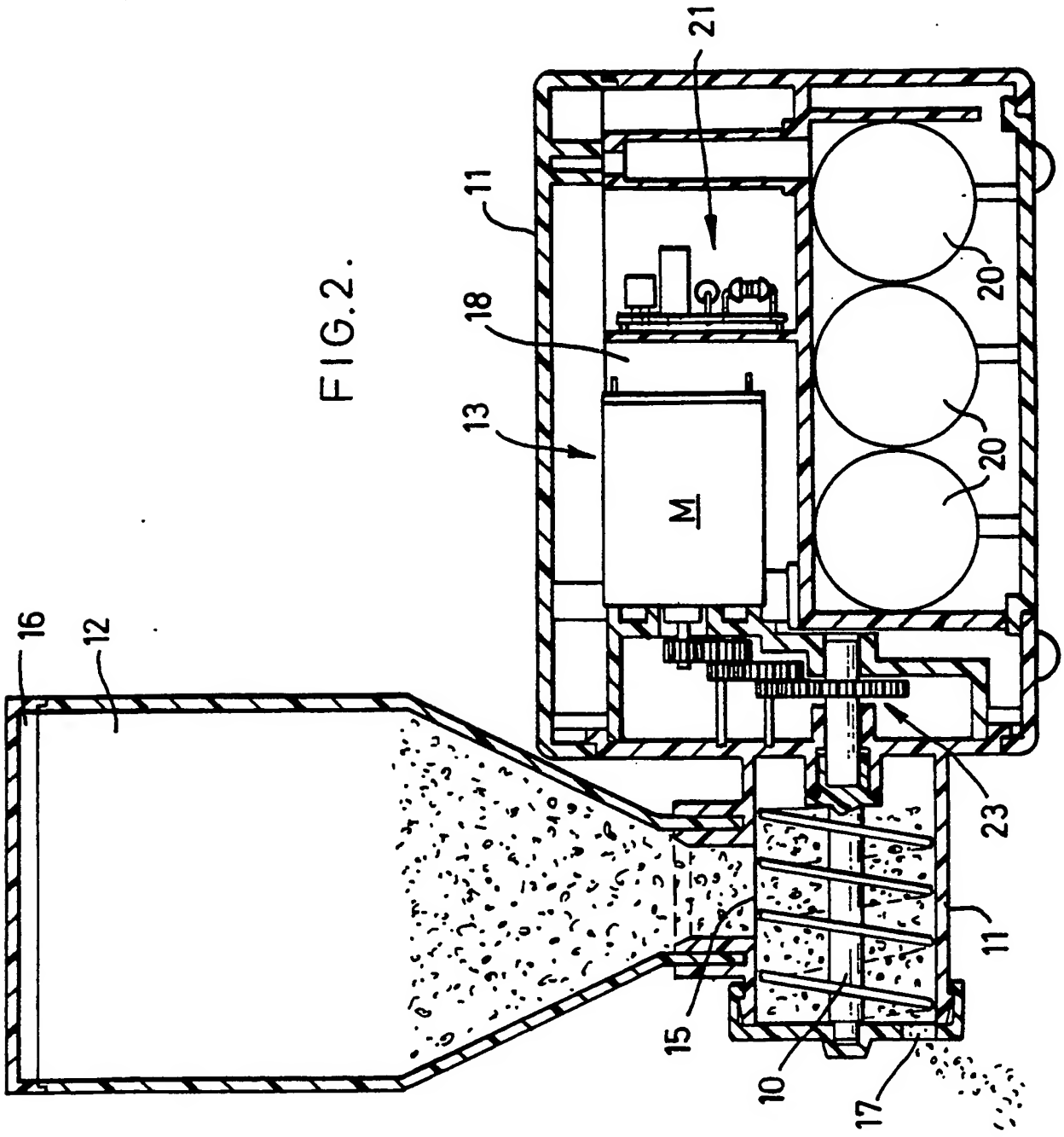


FIG.1.

FIG.2.



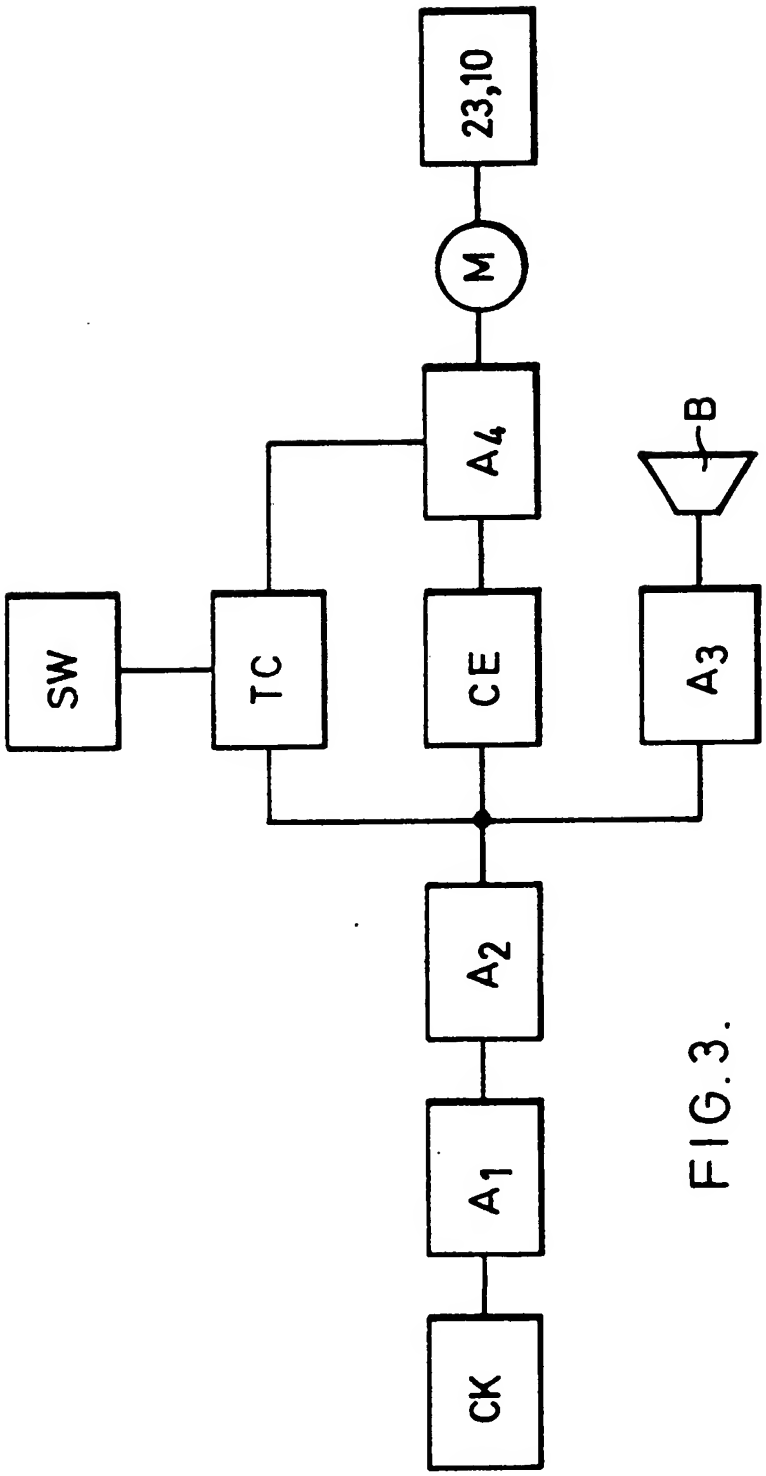


FIG.3.

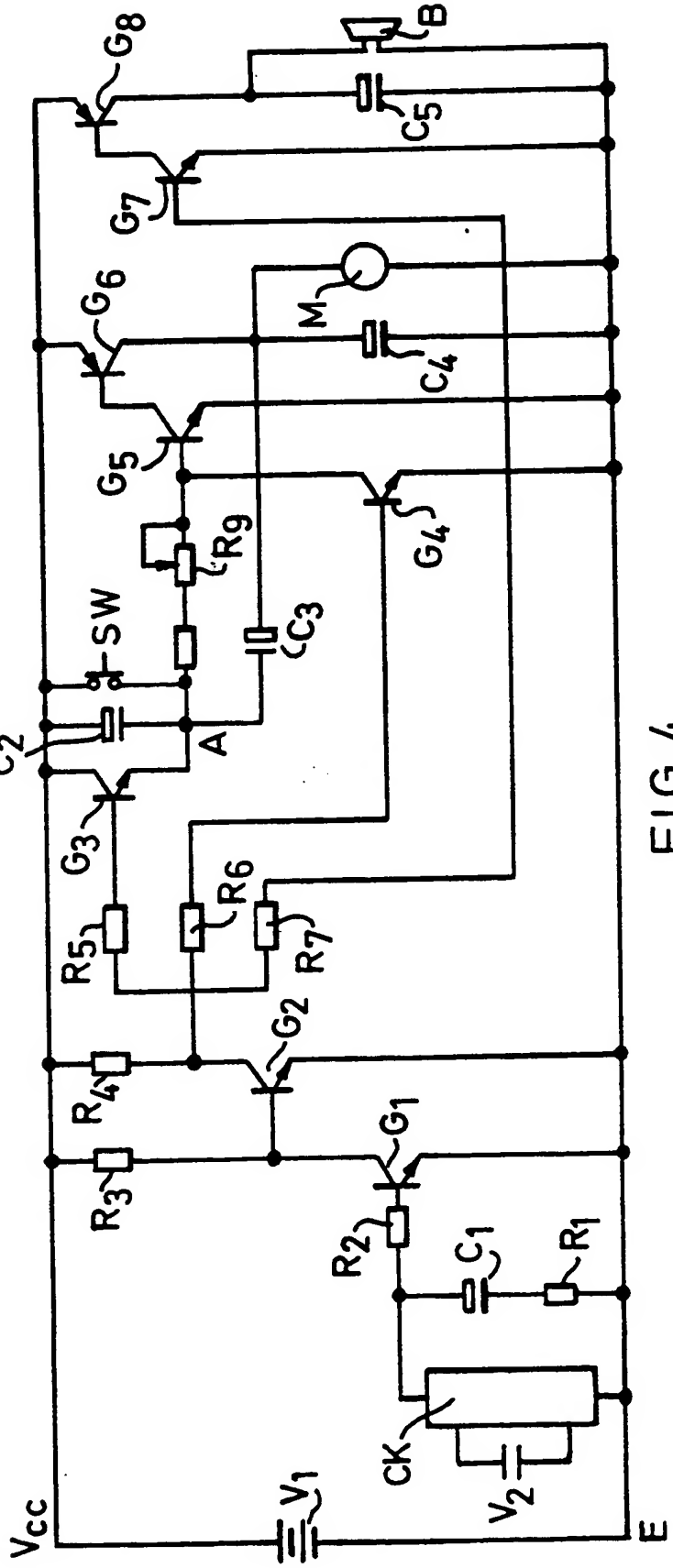

G8
B
C5
G7
G6
M
C4
G5
G4
R9
SW
C3
C2
A
G3
R6
R5
R7
G2
R4
G1
R3
R2
C1
R1
CK
V2
V1
Vcc
E

FIG.4.

2207331

FISH FOOD DISPENSER

This invention relates to a fish food dispenser.

Many people keep fish as domestic pets. The trouble is to feed the fish daily at regular hours, or when they are away from their homes for prolonged periods it is necessary to find someone to feed the fish.

The present invention seeks to provide a dispenser for automatically dispensing food to fish in a tank.

According to the present invention there is provided a fish food dispenser comprising a container for fish food, power driven dispensing means for dispensing fish food from the container, and means for energising the dispensing means at a preset time.

Preferably, the dispensing means is a motor driven metering device, such as a motor driven metering screw. Alternatively, the dispensing means could be a vibratory device.

Advantageously, the period of operation of the dispensing device can be varied to vary the quantity of food dispensed.

The invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a front view of a fish food dispenser embodying the invention;

Figure 2 is a sectional front view of the fish food dispenser of Figure 1;

Figure 3 is a block diagram representing an electronic control circuit of the fish food dispenser of Figure 1; and

Figure 4 is a practical implementation of the control circuit of Figure 3.

Referring firstly to Figures 1 and 2 of the drawings, the fish food dispenser shown therein comprises a metering screw 10 mounted for rotation in a metering chamber 11, a container 12 for fish food, a motor unit 13, and a control panel 14.

The container 12 is mounted on the upper wall of the chamber 11 and the lower end of the container 12 communicates with the upper end of the chamber 11 via an opening 15. The container 12 has a removable lid 16 so

that the container 12 can be replenished with fish food and the chamber 11 has a discharge opening 17 in one end wall.

The motor unit 13 is secured to the other end wall of the chamber 11 and comprises a motor unit housing 18 accommodating a fractional horsepower p.m.d.c. motor M, batteries 20, a control circuit 21, and a reduction gear train 23.

The motor M is connected to one end of the metering screw 10 via the reduction gear train 23 and is energised by the batteries 20 in response to the control circuit 21.

The control panel 14 is mounted on the front wall of the housing 18 and comprises a digital clock CK, display, set, and lamp buttons 25, 26 and 27 respectively, manually operable pushbutton switch SW, and fish food quantity control knob 29.

In use, the fish food dispenser may be mounted by any appropriate means above the water level on the top of a fish tank. Alternatively, the dispenser may be placed on a fish tank accessory, such as a pump, mounted on the top of the fish tank.

The block diagram of the control circuit 21 shown in

Figure 3 comprises the electronic digital clock CK having an alarm signal output which is fed to a two-stage amplifier circuit comprising amplifiers A_1 and A_2. Such a clock is well known and typically produces an alarm signal every 24 hours. The output of the amplifier A_2 is connected to a timing control circuit TC, a control element CE and an amplifier A_3. The output of the amplifier A_3 is connected to and provided for energising a buzzer B.

The manually operable switch SW is connected to and provided for controlling the timing control circuit TC.

The outputs of the timing control circuit TC and the control element CE are connected to an amplifier A_4. The output of the amplifier A_4 is connected to the motor M which drives the reduction gear train 23 and the metering screw 10 of the fish food dispenser when energised.

The buzzer B is energised by the amplifier A_3 in the presence of an alarm signal from the clock CK. Simultaneously, the timing control circuit TC is reset and the control element CE operates to ensure the motor M is in an inoperative state.

The alarm signal is arranged to last for approximately 30 seconds and thereafter the buzzer B stops signalling.

Simultaneously, the control element CE is disabled and the timing control circuit TC operates for a presettable time interval to energise the motor M. At the end of the preset time interval, the timing control circuit TC ceases to operate and the motor M stops.

Accordingly, the alarm signal is initiated by the clock CK at a preset time and the buzzer B is energised to alert a user of the dispenser that fish food is about to be dispensed. Subsequently, the motor M operates to drive the metering screw 10 to dispense fish food for a preset time interval. Alternatively, the fish food dispenser can be operated at any time by depressing the pushbutton switch SW.

Referring now to Figure 4 of the drawings, a practical implementation of the control circuit 21 is shown. A first DC voltage source V_1 is connected between a positive supply line Vcc and earth E. The electronic digital clock CK is powered by a second DC voltage source V_2. One terminal of the clock CK is connected to earth E. The other terminal of the clock CK is connected via a resistor R_2 to the base of a NPN transistor G_1 and connected via a series circuit of a capacitor C_1 and a resistor R_1 to earth E.

The collector and emitter of the transistor G_1 are respectively connected via a resistor R_3 to the supply

line Vcc and directly to earth E. The collector of the transistor G_1 is also connected to the base of a NPN transistor G2. Similarly, the collector and emitter of the transistor G_2 are respectively connected via a resistor R_4 to the supply line Vcc and directly to earth E.

The collector of the transistor G_2 is connected respectively via resistors R_5, R_6 and R_7 to the bases of NPN transistors G_3, G_4 and G_7.

The collector of the transistor G_3 is connected to the supply line Vcc. A parallel circuit of a capacitor C_2 and the pushbutton switch SW is connected between the supply line Vcc and the emitter of the transistor G_3 at a circuit node A. The base of a NPN transistor G_5 is connected to the circuit node A via resistors R_8 and R_9 connected in series, the resistor R_9 being a variable resistor and being adjustable by the control knob 29. The base of the transistor G_5 is also connected to earth E via the collector-emitter path of the transistor G_4.

The emitter of the transistor G_5 is connected to earth E, whilst the collector thereof is connected to the base of a PNP transistor G_6. The emitter of the transistor G_6 is connected to the supply line Vcc, whilst the collector thereof is connected via a capacitor C_3 to the circuit node A, and via a parallel circuit of the motor M and a

capacitor C_4 to earth E.

The base of a PNP transistor G_8 is connected to earth E via the collector-emitter path of the transistor G_7, and the emitter thereof is connected to the supply line Vcc. The collector of the transistor G_8 is connected to earth E via a parallel circuit of a buzzer B and a capacitor C_5.

The alarm signal of the clock CK is in the form of a pulsating DC output signal, which is converted into a continuous DC signal by means of a low-pass filter circuit comprising the capacitor C_1 and resistor R_1 before being fed to the transistor G_1.

The pair of transistors G_1 and G_2, which are referred to in Figure 3 as amplifiers A_1 and A_2, provide a two-stage amplification to the alarm signal. The transistor G_1 is switched on by the alarm signal; otherwise it remains in a blocking state. With the transistor G_1 in a saturated state, the base of the transistor G_2 is forced close to earth potential and the transistor G_2 results in a blocking state. However with the transistor G_1 in a blocking state, the base of the transistor G_2 is raised to a potential sufficient to switch on the transistor G_2. Therefore the transistors G_1 and G_2 are in complementary states.

Similarly, the transistors G_3, G_4 and G_7 are controlled by the transistor G_2 such that their states are complementary to that of the transistor G_2.

The transistors G_7 and G_8 constitute the amplifier A_3 of Figure 2. With the transistor G_7 in a conducting state, the base of the transistor G_8 is substantially shorted to earth E and the transistor G_8 switches on to energise the buzzer B. When the transistor G_7 and hence the transistor G_8 returns to a blocking state, the buzzer B ceases to operate.

The capacitor C_2 functions, as hereinafter described, as a timing element to determine the time interval during which the motor M operates. The transistor G_3 is provided to discharge or reset the capacitor C_2 when in a conducting state. The switch SW provides an alternative to the transistor G_3 for manual operation of the fish food dispenser.

The transistor G_5 controls the switching operation of the transistor G_6, which are referred to in Figure 3 as the amplifier A_4. With the transistor G_5 in a saturated state, the base of the transistor G_6 is substantially shorted to earth E and the transistor G_6 conducts to energise the motor M. The capacitor C_4 stabilises the operation of the motor M. Conversely, when the transistor

G_6 is in a blocking state with the transistor G_5, the operation of the motor M is disabled.

The transistor G_5 remains in a blocking state when the transistor G_4 is in a conducting state which lowers the potential of the base of the transistor G_5 substantially to earth potential. With the transistor G_4 in a blocking state, the switching of the transistor G_5 is controllable via the circuit path comprising the capacitor C_2 and the resistors R_8 and R_9 by the charging condition of the capacitor C_2.

The capacitor C_2 can be fully discharged by means of either the transistor G_3 or the manually operable switch SW. When the transistor G_3 returns to a blocking state at the end of the alarm signal or when the switch SW is released, electric current starts to flow along the circuit path. The base potential of the transistor G_5 rises to switch on the transistor G_5 and subsequently energise the motor M. Charge begins to accumulate in the capacitor C_2. A preset period of time later, which is determined by the time constant of the circuit path, the capacitor C_2 will be sufficiently charged to prevent further current flowing along the path. The transistor G_5 is thereby switched off resulting in the motor M being de-energised.

With this arrangement, the motor M starts to operate when the transistor G_3 returns from a conducting state to a blocking state, i.e. when the alarm signal from the clock CK ends. The motor M runs for a preset time interval which is determined by the time constant of the circuit path comprising the capacitor C_2 and the resistors R_8 and R_9. Hence the capacitor C_2 functions as a timing element whose charging time is presettable by the variable resistor R_9. The capacitor C_2 and resistor R_9 are selected to give a presettable time range between 1 and 12 seconds.

When the transistor G_4, which is referred to in Figure 3 as the control element CE, is in a conducting state, the collector-emitter path thereof ensures the blocking state of the transistor G_5. This avoids any premature operation of the motor M.

When the motor M starts to run, it produces virtually no back EMF at its terminals. Hence the motor starting current will be a few times higher than its normal running current. This requires a large base current to maintain the conducting state of the transistor G_6, and in turn a large base current to maintain the conducting state of the transistor G_5. As the circuit path comprising the capacitor C_2 and the resistors R_8 and R_9 is unable to

provide sufficient base current to the transistor G_5, the capacitor C_3 is provided as a feedback of the motor starting current to the base of the transistor G_5 via the resistors R_8 and R_9. This prevents the malfunction of the transistors G_5 and G_6 when the motor M starts to run.

Various modifications will be apparent to those skilled in the art, and it is intended to include all such modifications as fall within the scope of protection defined by the appended claims.

CLAIMS

1. A fish food dispenser comprising a container for fish food, power driven dispensing means for dispensing fish food from the container, and means for energising the dispensing means at a preset time.

2. A fish food dispenser as claimed in claim 1, wherein the power driven dispensing means comprise a motor driven metering device.

3. A fish food dispenser as claimed in claim 2, wherein the motor driven metering device comprises a rotatable metering screw, an electric motor for rotating the metering screw, and a reduction gear train between the motor and the metering screw.

4. A fish food dispenser as claimed in any one of the preceding claims, wherein said energising means include a clock settable to generate a dispensing signal at a preset time.

5. A fish food dispenser as claimed in any one of the preceding claims, wherein said energising means include means for varying the period for which the dispensing means is energised.

6. A fish food dispenser as claimed in any one of the preceding claims, including means for signalling that fish food is about to be dispensed.

7. A fish food dispenser as claimed in any one of claims 1 to 3, having a control circuit comprising a clock for providing an alarm signal at a preset time or times, first means responsive to the alarm signal for giving a warning signal and second means responsive to the alarm signal for energising the dispensing means.

8. A fish food dispenser as claimed in claim 7, wherein said second means energises the dispensing menas after said warning signal has been given.

9. A fish food dispenser as claimed in claim 8, including means for preventing energising of said dispensing means while said warning signal is being given.

10. A fish food dispenser substantially as hereinbefore described with reference to the accompanying drawings.